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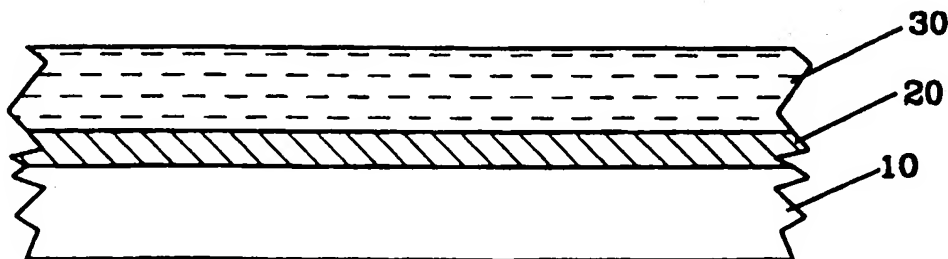
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(54) Title: LITHIUM ANODES FOR ELECTROCHEMICAL CELLS



(57) Abstract: Provided are anodes for use in electrochemical cells, wherein the anode comprises an anode active layer comprising lithium and a polymer anode substrate comprising a polymer film layer and a protective crosslinked polymer layer, in which the protective crosslinked polymer layer is in contact with the anode active layer on the side opposite to the surface in contact with the polymer film layer. The present invention also pertains to methods for forming such anodes and electrochemical cells comprising such anodes. The polymer film layer may be a terephthalate, a naphthalate, or an isophthalate, i.e. a polyester film. The protective crosslinked polymer layer may consist of acrylate polymer.

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# INTERNATIONAL SEARCH REPORT

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**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 H01M4/02 H01M2/16

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)  
EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 478 676 A (TURI ERAN ET AL) 26 December 1995 (1995-12-26) abstract; figures 2,3 column 2, line 10 - line 17 column 3, line 7 - column 4, line 6 column 4, line 44 - line 45; examples 12,14	12-14, 22,23
Y	----- -/--	1-3,6,9

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 615 961 A (PARK GEORGE B ET AL) 7 October 1986 (1986-10-07)  abstract column 2, line 50 - column 3, line 27 column 4, line 21 - line 32 column 6, line 30 - line 55 column 8, line 11 - line 15 column 10, line 4 - line 8	12, 15, 19, 20, 22, 23
Y	-----	1, 6-9
X	US 5 066 554 A (HOPE HENRY F ET AL) 19 November 1991 (1991-11-19) abstract; figure 3 column 2, line 14 - line 49	12, 20, 22, 23
Y	-----	1, 6-9
Y	US 5 395 644 A (AFFINITO JOHN D) 7 March 1995 (1995-03-07) column 2, line 25 - line 27 column 3, line 49 - column 4, line 32 column 5, line 10 - line 37	1-3, 6-9
A	----- US 6 277 514 B1 (YING QICONG ET AL) 21 August 2001 (2001-08-21) the whole document -----	22

# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5478676	A	26-12-1995	EP 0782771 A1 JP 11505660 T WO 9604689 A1	09-07-1997 21-05-1999 15-02-1996
US 4615961	A	07-10-1986	AT 60464 T AU 573637 B2 AU 3496184 A CA 1244876 A1 DE 3484011 D1 EP 0146246 A1 GB 2149565 A , B IL 73398 A IN 163202 A1 JP 60115156 A ZA 8408594 D	15-02-1991 16-06-1988 09-05-1985 15-11-1988 28-02-1991 26-06-1985 12-06-1985 20-10-1987 20-08-1988 21-06-1985 30-07-1986
US 5066554	A	19-11-1991	NONE	
US 5395644	A	07-03-1995	US 5260095 A US 5547508 A AT 170779 T CA 2142895 A1 DE 69320971 D1 DE 69320971 T2 DK 655954 T3 EP 0655954 A1 JP 8503099 T WO 9404285 A1	09-11-1993 20-08-1996 15-09-1998 03-03-1994 15-10-1998 27-05-1999 07-06-1999 07-06-1995 02-04-1996 03-03-1994
US 6277514	B1	21-08-2001	US 6183901 B1 US 6194098 B1 AU 2196000 A AU 2368100 A CN 1334969 T CN 1334970 T EP 1151486 A1 EP 1149425 A1 WO 0036670 A1 WO 0036671 A1 US 2001053475 A1 US 2001000485 A1 US 6410182 B1	06-02-2001 27-02-2001 03-07-2000 03-07-2000 06-02-2002 06-02-2002 07-11-2001 31-10-2001 22-06-2000 22-06-2000 20-12-2001 26-04-2001 25-06-2002